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# Happy New Year!

Initially I would like to wish you all a Happy New Year, and I hope all of you have enjoyed a couple of days off, - before starting 2011, which seems to become a busy year. The Danish North Sea is a mature area with challenges of declining oil production and with an oil price approaching 90 \$/Bbl again, I am certain that many interesting opportunities and projects will have to be evaluated.

In November Mike Kramer from SHELL spoke about the challenges in mature areas, and he discussed the necessary change in attitude from opportunity driven in the growth phase to focusing on operating costs and the continuous surveillance of well and reservoir performance. He even dared to ask whether Petroleum Engineers were the right people to take on this task, and I guess the answer has to be "yes" - but we certainly need to be aware of the change in operational mode.

The 18th of January DONG E&P will be hosting our first 2011 meeting, in Hørsholm. Mike Smith, Technical Manager in DONG's UK office, will give a review of DONG Energy's activities in the UK today, discuss the challenges it currently faces and what the future might hold.

As After Dinner speaker, Lars Jensen from DTU, will give us highlights from his PhD on "greener" Gas Hydrate Inhibitors.

In February, where Maersk Oil is sponsor, it is the second time we will welcome a SPE distinguished lecturer, namely Robert L. Dillenbeck III, who will be talking on Annular Isolation and our understanding of cement properties. The After Dinner speaker John Karlo, Maersk Oil, will take us on a virtual trip to South Italy to look at fractured carbonates.

I am looking forward to seeing you in January and February.

**Morten G. Stage, Section Chairman** ◀

## FUTURE MEETINGS

FOR MORE INFORMATION  
REGARDING THE PROGRAMME  
SEE PAGE 6



# SPE

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Tel.: + 45 3363 1735

e-mail: johannes.horikx@maerskoil.com

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e-mail: fboyd1@slb.com

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Tel.: +45 3337 2339

e-mail: tim.newman@shell.com

**Mette S. Munkholm, Baker Hughes**

Tel.: +45 3317 0468

e-mail: mette.munkholm@bakerhughes.com

# TRYM

## - CROSS BORDER OIL AND

When reaching deadline for this article DONG Energy was just about to be operator of a producing field on Norwegian continental shelf. The oil and gas field Trym was expected to be in production around New Years Eve, so hopefully the oil and gas is now flowing through the pipeline to the Harald platform for fiscal measurement and further export via the pipeline to Tyra.

"We are already involved in exploration and production licences in Norway. We are now looking forward to becoming active in Norway as a production operator," says Anders Mørland, responsible for DONG Energy's Norwegian E&P activities.

Getting approval for the development has not been business as usual since Trym is a Norwegian field with the production, according to the development plan, being led to the Harald platform on the Danish side of the border.

Therefore the Danish Energy Authorities as well as the Norwegian counterpart needed to approve the PDO (Plan for Development and Operation). DONG Energy was quickly given the permission to sign contracts with suppliers in order to get started on the field development and prepare for engineering and construction of the manifold, template and the necessary pipeline going from the manifold to the Harald platform.

The approvals were granted Spring 2009, and DONG Energy was on its way to become operator of a Norwegian field. Until now the company has been licence partner in several Norwegian licences including Ormen Lange with a 10 % share.



# SPE Student section news

## GAS PRODUCTION

Trym is located three km. north of the Danish/Norwegian border. The subsea installation, in 65 m. water depth, includes a four slot subsea template and two wellhead systems. The installation has two horizontal wells tied back to the Harald platform. The platform has been equipped with a subsea control system, hydraulic power unit, chemical injection system, metering facilities and an additional process module.

The gas from Tnym will after being processed be transported from Harald via DONG Energy's pipeline to the Tyra platform and onwards to Nybro in Denmark or Den Helder in the Netherlands, respectively. Oil and condensate will be transported from Harald via the Gorm field to Fredericia in Denmark via DONG Energy's pipeline. The operation phase of the Tnym facilities will be performed without any additional resources in the Maersk offshore organization at Harald. The new Tnym facilities at the Harald platform has been commissioned, and will be started-up, operated and maintained by Maersk.

The operation and maintenance of wells, subsea installations, umbilicals and flowlines will be planned and supervised from DONG Energy's office in Norway. The DONG operations team will have online offshore data both from wells, subsea installations and from the Harald platform and will perform surveillance, analysis, reporting and optimization of gas and condensate production.

The Danish Advanced Technology Foundation have chosen to support two large projects to take off in the beginning of 2011 at the Center for Energy Resources (CERE), DTU:

The first project, BioRec - Biotechnology in Oil Recovery - is a unique partnership between oil and biotechnology, represented by Maersk Oil and DONG Energy, and Novozymes, respectively. CERE will lead the project, and the other project partners are the University of Roskilde and the Danish Institute of Technology. The vision of the project is to develop biotechnological knowledge and technology to increase the amount of recoverable oil in Danish oil fields in the North Sea. This will be achieved by development of biotechnological tools that are significantly more efficient, more economically viable and environmentally safer than existing solutions. The overall budget is EUR 4.5 mio, where the Foundation supports with EUR 2 mio and Industry with EUR 1.5 mio.

The second project is a partnership between CERE-DTU and the Danish sonar company, Reson A/S. This project aims to develop a model for oil-polluted sea water and from there, a state-of-the-art sonar product with an effective method for the detection and quantification of oil in sea water. The overall budget for this project is EUR 2.3 mio. Where the Danish Advanced Technology Foundation supports the project with EUR 1.4 mio and Industry further adds EUR 0.5 mio. ◀



# DONG ENERGY ACTIVITY IN THE UK

DONG Energy entered the UK in the year 2000. At this time, the company was beginning to look at becoming more international in its outlook and could see the UK as the first logical step. However, the UK Continental Shelf at this time was already very mature and offered little in the way of opportunities. This led the company to embark on a bold move to build an E&P business exclusively in the West of Shetland area of the UK.

At that time, the West of Shetland area, although an area of exploration activity since the 1970's was not considered a 'hot spot' for activity despite being widely recognised as the last great under explored basin in the UK.

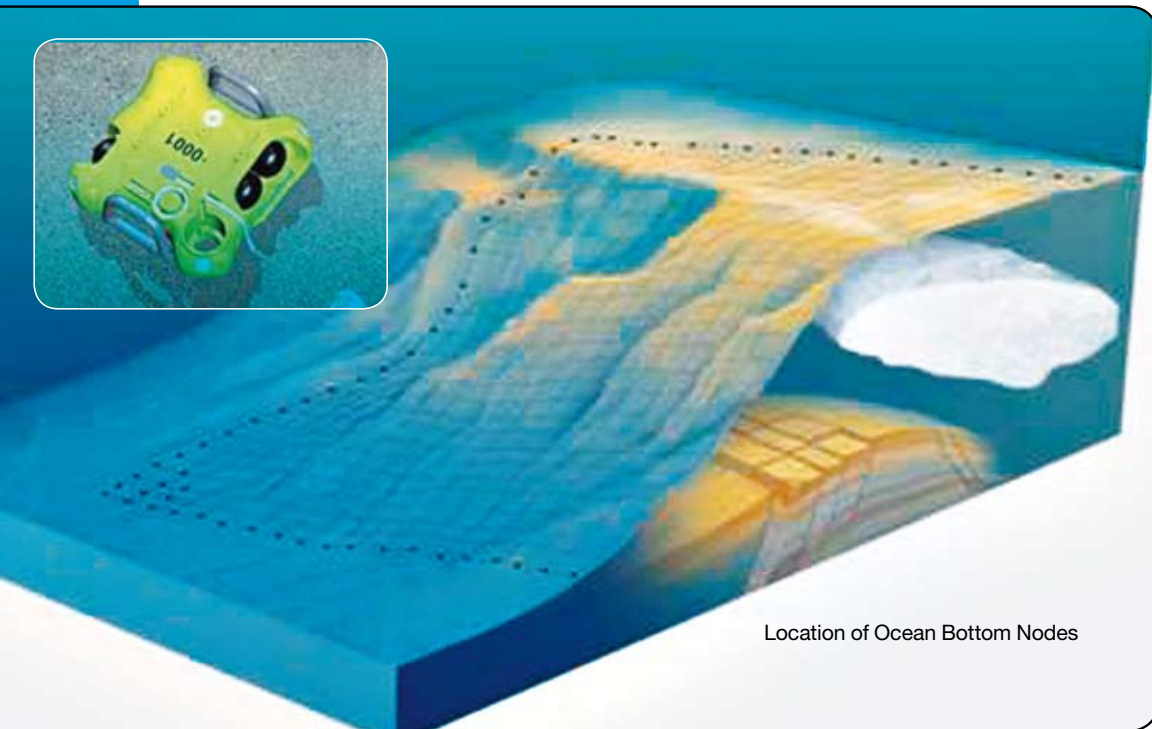
DONG rapidly built an acreage position, principally in a non-operated capacity, via both license rounds and business development acquisitions. This was done with a small team based in Denmark working on identifying opportunities and capturing them.

Following the merger of DONG E&P to form DONG Energy in 2006, the company also entered the Renewable energy market in the UK being one of the first participants in the UK offshore windfarm licensing rounds.

Today, DONG E&P is the biggest acreage holder in the West of Shetland area with 10 discoveries under various stages of

development and a very active exploration programme. It is both an operator and a non-operator with its first major operated development, Glenlivet, being discovered last year. DONG Energy, is also an integrated energy company in the UK, with the largest ongoing windfarm development campaign in the UK, and large modern gas fired power station which was recently placed onstream.

This talk will review the portfolio of DONG Energy in the UK today, discuss some of the background of how it got there, the challenges it currently faces and what the future might hold. ◀



Location of Ocean Bottom Nodes

## BIOGRAPHY

Mike Smith, DONG Energy



Mike Smith is the UK Technical Manager for DONG Energy. He has been in the E&P industry for some 20 years, having previously worked in a variety of technical, business development, and management roles both in the UK and Internationally.

His first introduction to DONG E&P was whilst working for Amerada Hess in the late 1990's, when he was involved in the South Arne development programme and worked with DONG in its capacity as drilling operator for the project.

Mike joined DONG E&P in the UK in 2007 as the 7th person in the local UK office. He has since seen the office grow to some 140 people covering both E&P, Thermal and Renewable Power, and Energy Markets. ◀

C O P E N H A G E N  
**J A N U A R Y**  
**M E E T I N G**  
TUESDAY 18 JANUARY 2011

**PROGRAMME**

17:00 - 18:00

Drinks

18:00 - 19:00

Presentation and SPE News

19:00 - 21:00

Dinner with speaker

**LOCATION**

DONG Energy  
Agern Allé 24-26  
2970 Hørsholm

**SPEAKER**

Mike Smith  
UK Technical Manager,  
DONG Energy

**TOPIC**

DONG Energy activity in the UK

**DINNER SPEAKER**

Lars Jensen  
Research assistant, DTU

**TOPIC**

Gas hydrates  
- new developments

**ENTRANCE FEE**

None

**REGISTRATION**

Please indicate your attendance  
by Thursday 13 January  
by signing up on the internet  
[www.spe-cph.dk](http://www.spe-cph.dk)

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# Gas hydrates

## - new developments

Gas hydrate formation in subsea transmission pipelines is the leading deep-water flow assurance problem and is listed as the major technical problem in offshore energy development. Traditionally the formation of gas hydrates in oil and gas pipelines has been prevented by injection of large amounts of antifreeze such as methanol or glycol. Alternatively the formation of gas hydrates can be controlled, using small amounts of polymeric compounds (kinetic inhibitors), which instead of inhibiting the formation thermodynamically work by slowing the formation rate (kinetics). Using kinetic inhibitors instead of the antifreeze may potentially lead to significant cost reductions in the operational expenses. However kinetic hydrate inhibitors have the biggest economic impact when designed into oil and gas production systems often affording multi-million dollar reductions in capital expenditure. Unfortunately most kinetic inhibitors are not approved for use in the Danish and Norwegian sector of the North Sea due to their poor biodegradability. Therefore there is a need to find/develop "green" kinetic inhibitors for this sector in particular. Various methods to obtain effective and biodegradable kinetic inhibitors can be applied like for instance molecular design, trial and error, computer simulations etc. In the work presented here a biomimetic approach has been applied to propose effective and biodegradable kinetic inhibitors - an approach that relies on the application of biological methods and processes found in nature to the design of engineering systems. ◀

## BIOGRAPHY

Lars Jensen, DTU



Lars Jensen is a research assistant at the Center for Energy Resources Engineering at the Technical University of Denmark (DTU). He has a M.Sc. (2007) in chemical engineering from DTU where he also recently completed a PhD study with the title "Experimental investigation and molecular simulation of gas hydrates". During his studies he has been a visiting scholar at Heriot-Watt

University and Colorado School of Mines and has published 7 papers in the areas of gas hydrates, spectroscopy and applied thermodynamics. He is currently working with oil-CO<sub>2</sub> PVT properties and gas permeability in polymers used in gas liners. ◀



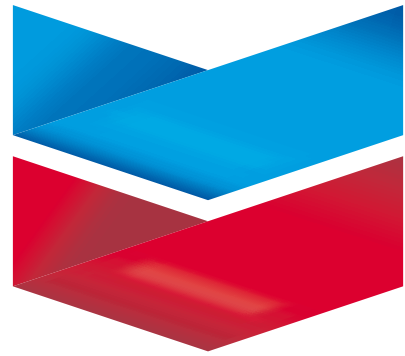
August 18		MAIN SPEAKER	AFTER DINNER
TOPIC	<b>EOR Seminar</b>		
SPEAKER			
LOCATION	DTU		
SPONSOR	SPE		
October 25		MAIN SPEAKER	AFTER DINNER
TOPIC	<b>Reliability of Expert Judgments and Uncertainty Assessments</b>		The step from IOR to EOR Jørgen Hallundbæk
SPEAKER	Steve Begg, SPE DL		
LOCATION	Moltkes Palæ		
SPONSOR	Chevron		
November 16		MAIN SPEAKER	DINNER SPEAKER
TOPIC	<b>Maturing E&amp;P portfolio - Preparing for new challenges</b>		Geothermal Tim Erdmann
SPEAKER	Mike Kramer, Shell		
LOCATION	Moltkes Palæ		
SPONSOR	Shell		
January 18		MAIN SPEAKER	AFTER DINNER
TOPIC	<b>DONG Energy activity in the UK</b>		Gas hydrates – new developments Lars Jensen, DTU.
SPEAKER	Mike Smith DONG E&P, UK		
LOCATION	DONG Energy		
SPONSOR	DONG Energy		
February 16		MAIN SPEAKER	DINNER SPEAKER / DISCUSSION
TOPIC	<b>Annular Isolation</b>		Fracturing and faulting in carbonates John Karlo, Maersk
SPEAKER	Robert L. Dillenbeck III, SPE DL		
LOCATION	Maersk		
SPONSOR	Maersk		
March 15		MAIN SPEAKER	DINNER SPEAKER
TOPIC	<b>Maximum Reservoir Exploitation, Higher Return on Capital?</b>		
SPEAKER	Lars Mangal, Welltec		
LOCATION	Welltec		
SPONSOR	Welltec		
April 12		MAIN SPEAKER	DINNER SPEAKER
TOPIC	<b>Upper Jurassic reservoir sandstones in the Danish Central Graben: new insights on distribution and depositional environments</b>		Outlook from the Danish North Sea Fund Peter Helmer Steen, Nordsøfonden
SPEAKER	Peter Johannessen, GEUS		
LOCATION	GEUS		
SPONSOR	GEUS		
May 17		MAIN SPEAKER	ANNUAL MEETING
TOPIC	<b>Intelligent Wells</b>		Annual General Meeting
SPEAKER	Younes Jalali, SPE DL		
LOCATION	Moltkes Palæ		
SPONSOR	HESS		
June tba		MAIN SPEAKER	DINNER SPEAKER
TOPIC	<b>SPE Summerparty</b>		
SPEAKER			
LOCATION			
SPONSOR			



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## The SPE Copenhagen Section Student Scholarship

The SPE Copenhagen Section Student Scholarship can be applied for once a year by students working with petroleum engineering or closely related topics. The total amount that can be applied for is 12,000 DKK. The scholarship can be applied for by filling in the application form, which can be downloaded from the website [www.spe-cph.dk](http://www.spe-cph.dk). The application form should be returned to the secretary of the SPE Copenhagen Section:

Daniel van Staalduinen • Chevron Denmark Inc.  
Parken, Øster allé 48 • 2100 Copenhagen Ø

The letter should be marked: SPE Student Scholarship.  
The application should be returned no later than 28 February 2011.



# Will CO<sub>2</sub> drive Enhanced Oil Recovery in Denmark?

Such a process of sweeping oil out from depleting fields has been used for years in the United States, increasing the recovery factor by five percentage points. The U.S. projects have not used CO<sub>2</sub> sourced from CCS projects, making Maersk Oil's proposal quite unique. While potentially recovering more oil than otherwise would be possible – with its financial, social and security benefits – Maersk Oil would also help mitigate CO<sub>2</sub> emissions by storing the harmful gas underground.

Although each field and its geology is different and it is impossible to predict the precise impact CO<sub>2</sub> injection would have on Danish North Sea oil production, several percentage points would make a big difference to the fields which are generally expected to have a recovery rate of just 30 percent.

The injection of CO<sub>2</sub> into an oil reservoir allows for the extraction of what would otherwise be non-productive oil.

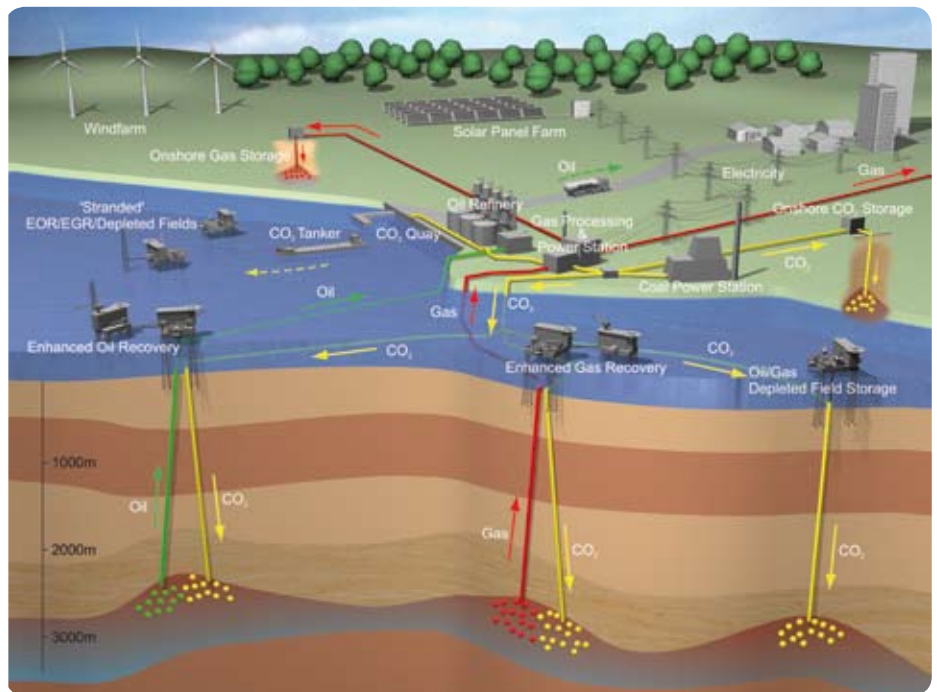
“Lab experiments and studies indicate that if we were to inject large quantities of CO<sub>2</sub> into our Danish fields, we would see tangible increases in production while simultaneously extending the productive lives of these fields well into the future,” said Franz Willum Sorensen, who is leading the EOR Project in Maersk Oil.

A key factor is that Maersk Oil does not own a supply of CO<sub>2</sub>, which means the gas must be sourced from elsewhere. At the moment, the only way this can make sense economically is to obtain CO<sub>2</sub> in

sufficient quantity and pressure from an energy producer already engaged in CCS projects.

CCS is seen as one of a number of technologies which promise to reduce CO<sub>2</sub> emissions globally and the European Commission will soon identify and help fund demonstration projects that capture CO<sub>2</sub> at large emission sources such as power plants.

“To succeed in our project, we will have to develop strong partnerships – with a European utility and its government, the



Danish Government, and the European Commission – and we will have to instill confidence in our technical ability to keep the CO<sub>2</sub> in the ground on a permanent basis,” Sorensen said.

“While this effort could have real upside potential, it would also give us considerable responsibility for the long-term storage of CO<sub>2</sub> and all of the uncertainties and potential liabilities that entails,” he said.

“Nevertheless, it goes without saying that in hydrocarbon production, consuming CO<sub>2</sub> is environmentally sounder than producing it.” ◀



# Maersk Oil opens new frontier in Greenland

Maersk Oil opened up a new frontier for its activities when it was granted an exploration licence in Baffin Bay of Greenland in December 2010.

The licence award caused tremendous excitement – the extreme weather and delicate environment in one of the world's remotest regions pose challenges on a scale that Maersk Oil has rarely encountered. But Greenland also has immense potential.

"Greenland's huge areal extent, its sometime harsh weather and its delicate marine ecosystems are awesome to behold," said Lars Nydahl Jørgensen, head of Exploration at Maersk Oil.

"Let me emphasise – we are absolutely committed to running an operation that is safe, responsible and respectful of this unique environment. To ensure this, we will assess all environmental aspects of our future operations, working closely with Greenland's authorities and independent arctic experts," he said.

With this in mind, Maersk Oil decided to establish a field research facility in Western Greenland and make it available for the scientific community at large.

The facility will be built onshore and will be open to scientists to use as a base for excursions offshore. Researchers will be able to benefit by taking samples from nearby waters to the facility to be analysed immediately, avoiding degradation and

contamination were they to be transported to research centres further afield.

Researchers will be able to process water samples, seabed sediments, measurements of air pollutants and of hydrocarbons in the water, analyses of trace metals and identify pelagic fauna and plankton.

The waters and lands in the region are characterised by low biodiversity but often with numerous and dense animal populations; a relative simple food web from primary producers to top predators and with a few species playing a key role in the ecology of the region.

Such work will help them investigate the background levels of contaminations such as hydrocarbons and heavy metals, which is important in assessing the environmental impact from petroleum activities.

As Greenland opens its waters to hydrocarbon exploration, it is important to build and expand a body of work that can detail the ecological system and biological life in this remote area, which has not been studied in great detail due to the harsh conditions and lack of infrastructure. ◀

## SPE YP News

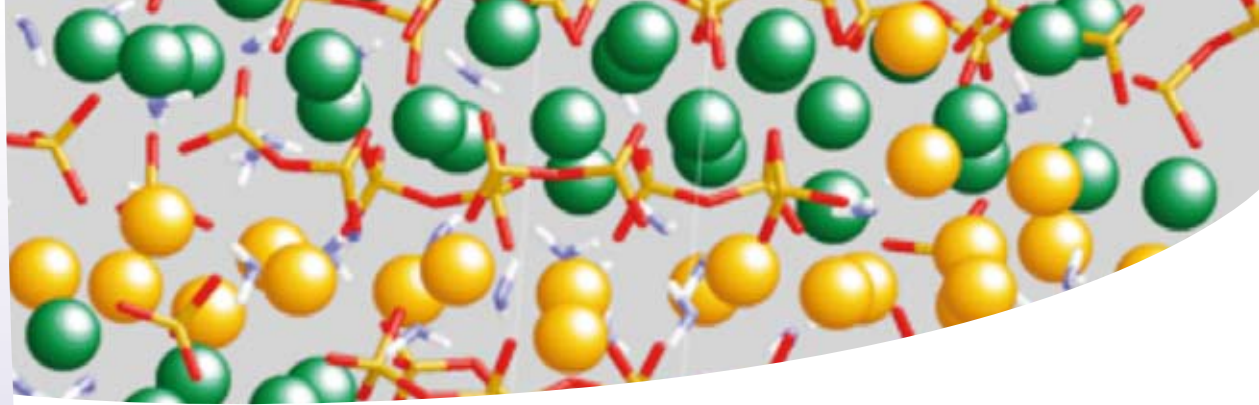
After a productive 2010 for the Young Professionals it is time to look forward to the coming year. Unfortunately, due to many work related relocations the board of 2010 is no longer with us in Copenhagen. So I would like to take this opportunity to thank them for their input to making 2010 such a successful year.

I'd also like to take this opportunity to call on any Young Professionals out there with an interest in helping 2011 become as big a success as 2010 in stepping forward to join the YP board. There are some exciting projects in the pipeline with invitations to the UN Global Compact, the EITI and IBIS having gone out. These speakers would touch upon subjects such as

transparency, corruption as well as ethical and social responsibility within the oil and gas industry.

As always any ideas for topics or speakers are very welcome and I hope to hear from the many volunteers wishing to contribute to the Young Professionals during the coming year.

Anders Krag Norman  
Young Professional Chairman  
spe.cph.yp@gmail.com



## ANNULAR ISOLATION: Moving from Rules of Thumb to Tomorrow's Technology

Historically, the petroleum industry has relied on API tests for determining unconfined cement compressive strength. The general rule of thumb has been that more is better. Given accurate mechanical properties data, today's computer models can quantify stresses imposed upon triaxially confined annular sealant sheaths, and it has become apparent that these complex induced stresses can often be either compressive or tensile in nature. When simulation models predict mechanical failure of the sealant, the mode of failure is often tensile in nature. This understanding, along with the need for accurate data to run induced stress simulation programs, has driven our industry to develop testing procedures for determining confined mechanical parameters such as Young's Modulus, Poisson's ratio and tensile strength. These parameters should be considered as important as sealant compressive strength when determining the fit-for-purpose suitability of an annular sealant design. Unfortunately, with no

API guidelines beyond compressive strength, most annular sealant mechanical behavior testing typically uses ASTM construction concrete test methodology. With typical oilfield cements, ASTM tests suffer from many shortcomings. These tests don't incorporate procedures to replicate the curing of the cement in downhole environments, and don't conduct the actual static tensile testing under conditions similar to those occurring in wells. As an example, even when oilfield cements are prepared and cured using API procedure in HTHP curing chambers prior to ASTM testing, they must still be subjected to significant unwanted induced stresses. This occurs because samples are cooled and de-pressurized back to ambient conditions before they can be subjected to ASTM tests. Samples of annular sealants prepared and tested in such a manner may undergo sufficient induced stress to exhibit signs of initial mechanical failure prior to even being placed in ASTM testing fixtures. Clearly, improved methods and equipment are necessary to better be able to quantify mechanical performance of annular sealants under actual downhole conditions. Luckily, efforts in that direction are beginning to move forward today. ◀

## BIOGRAPHY **Robert Lee Dillenbeck III, Chevron Energy Technology Company**



Lee Dillenbeck has been active in the Society of Petroleum Engineers (SPE) since 1981 as an industry recognized expert in annular isolation technology, having been an author on over 20 technical papers on the subject and holding nine U.S. patents with others pending. Publications in technical periodicals include SPE "Drilling" Magazine, "JPT", and "Harts E&P". He has served on various committees for the SPE Annual Technical Conference and exhibition (ATCE) and the Production Operations Symposium (P.O.S.) for the last sixteen years. He was also a participant at the SPE North American and Russian Forum Series on Cementing in Harsh Environments. Lee chaired cementing technical sessions at the 2003, 2004, 2005 and 2007 SPE ATCE events. He served as the Completions and Drilling technical coordinator for the 2006 SPE ATCE and in 2006 began serving a three year term on the SPE Books publication committee, which he currently chairs. Starting in 2008, he has served on the SPE ATCE Education, Professionalism and Training (ETP) technical program committee and continues to do so today. Lee also served as the chairman of drilling and completions technical program committee for the 2009 SPE LACPEC conference in Cartagena, Colombia. ◀

# A VIRTUAL FIELD TRIP TO SOUTH ITALY TO SEE HOW FRACTURING AND FAULTING REALLY WORKS IN CARBONATE ROCKS

To say one is dealing with fractured reservoir is actually being very unclear. 'Fractured reservoir' is a very non-specific term. As an analogy it is like saying an animal is an arthropod - which doesn't clarify if the animal is a lobster or a butterfly. The term 'Fractured reservoir' encompasses a number of phenomenon which can best be understood as an evolutionary hierarchy. The different types of fracturing phenomenon, ranging from millimeter to plate tectonic scale are excellently exposed in the massive Cretaceous limestones quarried in southeast Italy. As a picture is worth a thousand words, a pictorial walk through will be presented of this hierarchy as a function of increasing deformation. ◀



## BIOGRAPHY **Dr. John Karlo, Maersk Oil**



Geologist with Maersk Oil specializing in structural geology and basin analysis. His career began as a university professor in Michigan, then in industry for 30 years, mostly with Shell Oil. Career focus has been in exploration, primarily new ventures, with experience in more than 25 basins world wide, lately with emphasis in deep water and turbidite plays. The presentation is based on a training course he gave in support of Maersk's Qatar development on the subject of what actually is a fractured reservoir. ◀



COPENHAGEN  
**FEBRUARY**  
**MEETING**  
WEDNESDAY 16 FEBRUAR 2011

### PROGRAMME

17:00 - 18:00

Drinks

18:00 - 19:00

Presentation and SPE News

19:00 - 21:00

Dinner with speaker

### LOCATION

Mærsk Oil

Esplanaden 50

1263 København K

### SPEAKER

Robert L. Dillenbeck III

SPE DL

### TOPIC

Annular Isolation

### DINNER SPEAKER

John Karlo

Mærsk Oil

### TOPIC

Fracturing and faulting  
in carbonates

### ENTRANCE FEE

None

### REGISTRATION

Please indicate your attendance  
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## Making the most of global resources



Maersk Oil is a global operator producing some 700,000 barrels of oil equivalent per day. We turn opportunities into reality by continuously improving our technical capabilities and developing new innovative solutions.



With operations and activities in several locations such as the North Sea, Qatar, Brazil, Algeria, Angola, Kazakhstan and the US Gulf of Mexico, Maersk Oil aims to serve its many stakeholders by operating safely and efficiently.

The career opportunities we offer are as diverse as our geographical spread making a powerful proposition for professionals who wish to be at the forefront of the oil and gas industry.

At Maersk Oil we foster a creative environment where employees are empowered to develop solutions to highly technical and complex challenges.

As we make the most of our global resources, you can make the most of the opportunities we offer.

Explore more at [www.maerskoil.com](http://www.maerskoil.com)

ACTIVE SINCE 1962 MAERSK OIL IS A TRULY GLOBAL OPERATOR EMPLOYING  
SOME 3,500 PEOPLE - 1/3 OFFSHORE AND 2/3 ONSHORE.

 **MAERSK  
OIL**